While the invention has been described in its presently preferred embodiment it is understood that the words which have been used are words of description rather than words of limitation and that changes within the purview of the appended claims may be made without departing from the scope and spirit of the invention in its broader aspects.

What is claimed is:

1) A method for groundmapping with a Synthetic Aperture Radar system comprising the steps of:

transmitting a series of stepped frequency chirped pulse pairs towards a terrain of interest; and

processing target echo return signals from the terrain of interest to develop a terrain map thereby.

2) A method, as defined in Claim 1, wherein said transmitting step comprises transmitting a series of first and second chirped pulse pairs wherein said second chirped pulse pair always has a frequency higher than the first pulse pair.

3) A method, as defined in Claim 2 wherein said transmitting step comprises transmitting a chirped pulse using $\Phi_m^T(t,n) = f_m t + \frac{\gamma}{2}(t-t_n)^2$, and wherein said processing step comprises processing $\Phi_m^R(t,n) = f_m(t-\tau_{t,m}) + \frac{\gamma}{2}(t-t_n-\tau_{t,m})^2$ as a received signal by dechirp processing which mixes the received signal with a reference signal composed of: $\Phi_m^{REF}(t,n) = f_m t + \frac{\gamma}{2}(t-t_n-\tau_{s,m})^{2^2}$ where

γ equals a chip slope, n equals a pulse index, and a reference point at step m will be denoted by $\tau_{t,m}$ and $\tau_{s,m}$ where new time variable $\hat{t} = t - t_n$.

4) A method for groundmapping with a Synthetic Aperture Radar system comprising the steps of:

transmitting a series of stepped frequency chirped pulse pairs toward a target of interest to generate target echo return signals in a data system;

dechirping the target echo return signals in the data stream to produce pairs of sub-pulse range samples;

combining pairs of sub-pulse range samples to produce a synthetic wide-band equivalent data stream; and

performing terrain mapping on the wide-band equivalent data stream.

5) A method for groundmapping, as defined in Claim 4, wherein said transmitting step comprises transmitting a series of first and second chirped pulse pairs wherein said second chirped pulse in the pair always has a higher frequency than the first chirped pulse in the pair.

6) A method, as defined in Claim 5, wherein said transmitting step comprises transmitting a chirped pulse using $\Phi_m^T(t,m) = f_m t + \frac{\gamma}{2}(t - t_n)^2$, and wherein said dechirping step comprises processing $\Phi_m^R(t,n) = f_m(t - \tau_{t,m}) + \frac{\gamma}{2}(t - t_n - \tau_{t,m})^2$ on a received signal by dechirp processing which mixes the received signal with a reference signal composed of: $\Phi_m^{REF}(t,n) = f_m t + \frac{\gamma}{2}(t - t_n - \tau_{s,m})^{2^2}$ where γ equals a chip slope, n equals a

pulse index, and reference point at step m will be denoted by $\tau_{t,m}$ and $\tau_{s,m}$ where new time variable $\hat{t} = t - t_n$.